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AWS PAMPHLET 50-8

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Training

METEOROLOGICAL SATELLITE TRAINING

This pamphlet applies to all Air Weather Service units which operate meteorological satellite (METSAT) receivers or use METSAT imagery. It outlines a basic program format units may use to implement and/or manage their METSAT program.

1. **General:** AWSR 105-20, Meteorological Satellite Data, establishes basic METSAT training requirements. This pamphlet describes a sample METSAT training program based on those requirements. This pamphlet provides general guidance only. Units should tailor their program to their specific mission support requirements.

2. **Concept of training:** AWS training occurs at a variety of different levels such as university education, Air Training Command (ATC) resident and Mobile Training Team (MTT) courses, Extension Course Institute (ECI) correspondence courses, and on-the-job training (OJT). This pamphlet discusses METSAT training available at different levels, but concentrates on unit-level OJT. Unit METSAT training should parallel the dual channel OJT concept defined in AFR 50-23, On-The-Job Training, consisting of obtaining knowledge and task qualification.

a. Units conduct METSAT knowledge training through self-study, the use of follow-on training (FOT) materials, and informal lectures/briefings.

b. Units conduct METSAT qualification (task) training through hands-on training in accordance with (IAW) AFR 50-23, chapters 3 through 5.

3. **Terms Defined:** AWSR 105-20, Section A, and the Weather Service Forecasting Handbook No. 6, glossary, lists terms unique to METSAT equipment and imagery interpretation. Block 5D Operating Procedures for Tactical Sites, provides information and terms for tracking polar orbiting satellites and determining earth location of data.

4. **Directives:** Attachment 2 lists directives which relate to the entire METSAT program.

5. **Unit METSAT Coordinators (MSC) and METSAT Specialists (MSS):** AWSR 105-20 lists general duties and responsibilities for both MSCs and MSSs. Additionally, each unit should have a 105-series detachment operating instruction (OI) which details MSC/MSS duties and responsibilities based on the needs of the unit and customers supported. Each unit should also have standing operating procedures (SOPs) which detail how the unit will use METSAT imagery, or perform METSAT related tasks. Attachment 3 of this pamphlet contains a sample OI and two sample SOPs.

a. The MSS (or MSC if the unit has one) should manage and document unit METSAT training.

b. Likewise, the MSS (or MSC), should train all unit observers and forecasters to operate METSAT weather communications equipment (such as the GOES TAP imagery processors and recorders), operate satellite receiver equipment (excluding Mark IIA/III/IV), and train all unit

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forecasters to analyze, interpret, and apply METSAT data. This training is part of the forecaster or observer local initial certification process.

c. MSC/MSS Training:

(1) AWS units should send forecasters designated as MSCs or MSSs to the Weather Satellite Systems and Photo Interpretation course, C3OZR2524-009, at Chanute AFB IL, or the condensed version conducted by the Chanute Mobile Training Team (MTT), course: C4OST2524-006. MSSs and MSCs need not attend this course for subsequent assignments. Currently, the course contains four hours of METSAT program management instruction. Units should identify requirements for this training through their local CBPO during the annual screening cycle IAW AFR 50-5, Formal Schools. Out of cycle, units may request this training through the local CBPO or through channels to HQ AWS/DOT, IAW AFR 50-5. AWSR 52-6, Requirements for Technical Training and Application and Selection Procedures, provides additional guidance.

(2) AWS units should train MSCs on system operation including data processing, imagery enhancement, and product dissemination through hands-on training on the appropriate equipment (MARK IIA/III). When experienced people aren't available to provide OJT, units should request special training IAW AFR 50-9, Special Training, and AWSR 52-6. All MSCs which will use the Mark IV equipment should attend the Mark IV Satellite Receiver Operation Course, C4OST2524-007. To request this training, units should use the procedures in paragraph 5c(1) above.

(3) Both MSCs and MSSs should complete the unit's initial and recurring training.

(4) At wing/squadron discretion, MSC/MSS theater training/orientation may be appropriate. For example: Training provided by Det 1, 1 WW, Nimitz Hill, Guam, for MSCs from the Pacific, Tactical Terminal (TACTERM) sites, on satellite reconnaissance of tropical cyclones.

6. Formal Training Courses:

a. The Weather Technician course, C3AAR25170-004, provides AWS forecasters (251X0) with introductory (5 hours) and advanced (14 hours) METSAT imagery interpretation.

b. The supplemental course, Weather Satellite Systems and Photo Interpretation, C3OZR2524-009, provides an introduction to satellite systems and trains forecasters to analyze, interpret, and apply satellite data. An outline of this course is in attachment 4. This is a two-week, ATC-funded course taught at Chanute AFB IL. Mobile Training Teams (MTTs) also conduct a shorter version of this course (C4OST2524-006) at field locations as required. An outline of this course is in attachment 5. To request this training, units should use the procedures in paragraph 5c(1) above.

c. The Advanced Satellite Interpretation Workshop, C5OSG2524-004, trains forecasters in the latest satellite imagery interpretation and application techniques needed to provide technical consulting, unit satellite training, or operational forecasting in data-sparse areas. This is usually a 2-3 day, unit-funded course (ATC funds the instructor) administered by HQ AWS/DN and conducted quarterly at various locations throughout the continental US. Workshop content varies. Officers and airmen should attend this course if they are involved in the AWS Technical Consultant Visit (TCV) program, are responsible for unit/section satellite training, or are assigned duties using METSAT data to produce forecasts for data-sparse areas. HQ AWS/DN schedules these workshops, determines the number of attendees, and allocates student quotas for each wing.

d. The Mark IV Satellite Receiver Operation Course, C4OST2524-007, is a one-week, unit-funded course held at various Mark IV sites. An outline of this course is at attachment 6. Instructors can conduct this course with one student, two is optimum. New MSCs expected to operate this equipment, should attend this course. The course teaches students to apply meteorological knowledge in order to fully exploit the unique capabilities of the Mark IV. To request this training, units should use the procedures in paragraph 5c(1) above.

7. METSAT Training Program: AWSR 105-20 requires units to develop a training program for forecasters and observers. Generally, each unit training program should consist of the following:

a. Initial qualification training. Units train forecasters and observers to operate equipment, (including preventive maintenance and replacing expendable supplies) and train forecasters to analyze, interpret, and apply METSAT imagery to analysis, initialization of numerical models, and forecasting.

b. METSAT Recurring Training: A recurring training program ensures forecasters and observers maintain their skills and proficiency by reviewing selected portions of the unit's initial training materials and conducting seminars of seasonal interest. Guidelines for building a METSAT recurring training program:

(1) The MSC/MSS and station chief should determine what topics in METSAT imagery interpretation/analysis play key roles in conducting the local analysis and forecast program on a seasonal basis. Wing/Squadron TCVs can also provide assistance in this area.

(2) The MSC/MSS should consult AWS/TC-87/001, The Catalog of AWS Technical Documents, and the list of additional training materials attached to this pamphlet, to find technical materials which present information on seasonal topics.

(3) The MCS/MSS should work with the station chief to schedule training seminars on a seasonal basis. Seminars may range from viewing slide/tape materials to presentations by the MSC/MSS or other forecasters or observers. See the recurring training portion of the Sample DOI and SOP in attachment 3.

NOTE: Units should not document recurring training. Instead, units should schedule and track this training on an AF Form 1320 or suitable substitute (see paragraph 8).

c. A list of suggested materials units may use for both initial qualification and recurring training is in attachment 7. The Catalog of AWS Technical Documents, AWS/TC-87/001, has a complete listing of METSAT references (listed as "satellites") and follow-on training (FOT) modules.

8. Scheduling Training: Units should schedule training by using one-line entries on an AF Form 1320, Training Chart, locally devised chart or form, or any other device which provides visibility and aids planning, scheduling, and tracking training. For example, units can use a computer to develop a training schedule data base and periodically print out the data in a format similar to the AF Form 1320. METSAT training in the unit is a part of initial upgrade/qualification training leading to either forecaster or observer

certification. Therefore, units may include METSAT items on charts, forms or devices used for forecaster or observer training. Units may wish to put MSS/MSC duty training (qualification training only) items on a separate form.

a. List all major training tasks and recurring training topics, along the top of the form. Be sure to list any FOT materials used in each area. Down one side, list the names of the unit trainees.

b. Indicate a completed item or phase by placing the appropriate date in the block where the item and the person's name cross. Some locally devised charts have room to indicate the date the item was started.

9. **Suggested on-the-job training procedures:** Attachment 1 is a sample unit training checklist MSCs/MSSs may use to conduct and evaluate training. It identifies tasks which units may use and/or add to the unit's training program; it lists knowledge and task training items and corresponding study references for each item. Units shouldn't use the checklist to document training.

a. The MSS/MSC begins by conducting qualification training IAW AFR 50-23, chapters 3-5. This includes demonstrating to the trainee how to accomplish each of the tasks. The trainee should practice tasks to gain proficiency.

b. At the same time, the MSS/MSC begins conducting task knowledge training. The MSS/MSC assigns readings from the study references listed on the checklist. The MSS/MSC supplements the reference material with informal lectures/briefings and follow-on training (FOT) materials and answers any questions the trainee may have.

c. As the trainee progresses and demonstrates position qualification by satisfactorily performing tasks, the MSS/MSC circles the "GO" for each task on the checklist.

d. Likewise, the MSS/MSC does the same for knowledge proficiency items. The MSS/MSC continues to discuss knowledge items with the trainee until the trainee is comfortable with the concepts and can successfully respond to the checklist items.

e. After the trainee completes an item, the MSS/MSC logs the date on the training chart. This process continues until the trainee completes all of the items.

10. **Documenting Training:**

a. Units document METSAT training as part of forecaster and observer upgrade/qualification training using procedures in AFR 50-23, On-the-Job Training, for new MSSs, forecasters, and observers (E-6 and below). Units don't need to document this training for master sergeants and above, officers, and civilians. These people are considered trained to perform these duties when they are certified as forecasters IAW AWSR 52-3 (see paragraph 11, below).

b. Job Qualification Standard (JQS) Entries: The 251X0 Specialty Training Standard (STS, converted to a JQS) has entries to document METSAT training for airmen, E-1 through E-6. AFR 50-23 details how to complete the JQS.

c. Units document MSS duty training for new MSSs (through grade E-6) as qualification training IAW AFR 50-23. AWSR 105-20, Meteorological Satellite Data, attachment 2 lists MSS duties. Also be sure to add any unit-unique training tasks. Since the STS/JQS has no entries for this training, units should use AF Form 797, Job Qualification Standard Continuation Sheet.

11. **Certifying Training:** Forecaster and observer certification includes METSAT task qualification training. AWSR 52-3, Certification of Weather Personnel, provides guidance on forecaster and observer certification procedures.

a. When all METSAT training is complete, the MSS/MSC should review the checklist with the trainee to ensure proficiency. The certifying official (station chief/det chief/detco) evaluates the trainee prior to certification (as a forecaster or observer). This is done by going through the checklist with the trainee, item by item, to ensure the trainee can respond to/do all items listed.

b. The MSS/MSC schedules more training for those items circled as "NO GO." The trainee doesn't need to repeat the entire checklist.

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METSAT Initial Training Checklists

The initial METSAT training checklists provided below are broken up into three basic categories: 1, Satellites; 2, METSAT Imagery Analysis; and 3, Equipment Operation.

1. Satellites: This section provides basic background information on METSATs, how data is collected, type and resolution of data, how imagery gets from the satellite to the unit and so forth (NOTE: Your unit may not need to train people on all satellite systems. Use only the portions of the checklists which pertain to your unit). In several instances the references are listed as "local procedures." This is because the information presented will vary from unit to unit. Example: A unit receiving TIROS APT imagery may not have IR enhancement capability, whereas TIROS data received via SIDS from a DMSP site is enhanced. However, enhancements applied at one site may be different than enhancements applied at a different site. Additionally, not all of the material below applies to all units. A CONUS unit receiving GOES data via a WSFO drop would not be concerned with the working of GMS or METEOSAT, or with how data is distributed via WEFAX. In the following checklists, study reference pages are included in parentheses after each item.

a. Geostationary satellites:

(1) GOES—All references are to the GOES Users Guide, Jun 83 unless otherwise indicated.

(a) Describe the following satellite parameters:

Standard number in orbit
(pg 1-1) GO/NO GO

Location in orbit
(1-1 to 1-2) GO/NO GO

Type of orbit
(2-1) GO/NO GO

(b) Describe the following satellite subsystems:

VAS
(2-1 to 3-2) GO/NO GO

Visible spectrum range/resolution
(2-1 to 3-2) GO/NO GO

IR spectrum range/resolution
(2-1 to 3-2) GO/NO GO

Imaging
(2-1 to 2-2) GO/NO GO

(c) Describe the following aspects of how the GOES system acquires and distributes data:

Stretched VISSR concept/sectorizor
(4-1 to 4-2) GO/NO GO

Data path from the satellite to the unit via:

GOES TAP
(5-1 to 5-2) GO/NO GO

WSFO TAP (DROP)
(5-1 to 5-2) GO/NO GO

WEFAX
(4-6 to 4-9) GO/NO GO

(d) Describe types of imagery available to the unit.
(6-1 to 6-3/MIRF) GO/NO GO

(e) Describe sector coverage available to the unit.
(8-1 to 8-27/MIRF) GO/NO GO

(f) Describe the following features of IR enhancement:

Background and uses
(7-1 to 7-10) GO/NO GO

Operational enhancement curves available to the unit.
(7-11 to 7-45/MIRF) GO/NO GO

(g) Demonstrate ability to interpret GOES-coded ID header.
(6-26 to 6-28/MIRF) GO/NO GO

(2) METEOSAT—All references are to ESA SP-1041, Introduction to METEOSAT, Nov 81, unless otherwise indicated.

(a) Describe the following satellite parameters:

Standard number in orbit
(pg 2) GO/NO GO

Location in orbit
(2) GO/NO GO

Type of orbit
(1) GO/NO GO

(b) Describe the following satellite subsystems

Radiometer
(13 to 16) GO/NO GO

Visible spectrum range/resolution
(13 to 16) GO/NO GO
IR spectrum range/resolution
(13 to 16) GO/NO GO
Water vapor channel resolution
(13 to 16) GO/NO GO
Imaging
(17 to 19) GO/NO GO

(c) Describe how the METEOSAT system acquires and distributes data.
(35 to 37) GO/NO GO

(d) Describe the data path from the satellite to the unit via:
WEFAX
(35-36) GO/NO GO
SIDS DROP
(local procedures) GO/NO GO

(e) Describe the imagery available to the unit via:
WEFAX
(38 to 40/MIRF) GO/NO GO
SIDS Drop
(local procedures/MIRF) GO/NO GO
GOES TAP
(GOES users guide, pg 5-2 & MIRF) GO/NO GO

(f) Describe the IR enhancement curves available to the unit.
(local procedures/MIRF) GO/NO GO

(g) Demonstrate ability to interpret
METEOSAT imagery header.
(47/MIRF)

(3) GMS (Geosynchronous Meteorological Satellite). All references are to 1WW/TN-83/001, METSAT Users Guide, May 83, unless otherwise indicated.

(a) Describe the following satellite parameters:
Standard number in orbit
(15 to 16) GO/NO GO
Location in orbit
(15 to 16) GO/NO GO
Type of orbit
(15 to 16) GO/NO GO

(b) Describe the following satellite subsystems:
VISSR (16) GO/NO GO
Visible spectrum range/resolution
(16 to 17) GO/NO GO
IR spectrum/resolution
(16 to 17) GO/NO GO
Imaging
(16) GO/NO GO

(c) Describe the following aspects of how the GMS system acquires and disseminates data:
HR FAX
(16 to 17) GO/NO GO
Data path from the satellite to the unit
(16 to 17) GO/NO GO

(d) Describe the types of imagery available to the unit via:
SIDS Drop
(local procedures/MIRF) GO/NO GO
GOES TAP
GOES Users Guide, pg 5-2) GO/NO GO

(e) Describe the IR enhancement curves available to the unit.
(local procedures/MIRF) GO/NO GO

(f) Demonstrate ability to interpret GMS imagery-coded ID header.
(38) GO/NO GO

b. Polar orbiting satellites.

(1) DMSP—References are to AWSTR 74-250 unless otherwise indicated.

(a) Describe the following satellite parameters:
Standard number in orbit
(Mark IV Users Guide pg 3-5) GO/NO GO
Times of nodal crossing
(Mark IV Users Guide pg 3-5) GO/NO GO

Type of orbit
(6-1) GO/NO GO

(b) Describe the following satellite subsystems
OLS
(3-1) GO/NO GO
Visual spectrum range
(3-1) GO/NO GO
LF (VHR) resolution
(5-1) GO/NO GO
LS (HR) resolution
(5-1) GO/NO GO
IR spectrum range
(3-1) GO/NO GO
TF (WHR) resolution
(5-1) GO/NO GO
TS (MI) resolution
5-1) GO/NO GO
LF & TS Daylight data transmission
(4-6 to 4-7) GO/NO GO
LS & TF Night data transmission
(4-6 to 4-7) GO/NO GO

(c) Describe the data path from the satellite to the unit (handcarry, SIDS, DFS)
(local procedures) GO/NO GO

(d) Describe the types of imagery available to the unit.
(local procedures/MIRF) GO/NO GO

(e) Describe the operational IR enhancement curves applied to DMSP imagery.
(local procedures/MIRF) GO/NO GO

(f) Demonstrate ability to interpret the legend on imagery received from Mark IV TACTERMS via TIDS/SIDS.
(Mark IV Users Guide, pgs 1-5 to 1-7) GO/NO GO

(g) Demonstrate ability to interpret the header (AWS Form 54) on imagery received from Mark IIA/III TACTERMS via SIDS.
(local procedures) GO/NO GO

(h) Demonstrate ability to manually grid DMSP imagery
(local procedures, and pgs 6-3 to 6-8) GO/NO GO

(2) TIROS—All references are to the TIROS-N Series Direct Readout Services Users Guide, unless otherwise indicated.

(a) Describe the following satellite parameters:
Standard number in orbit
(1-3) GO/NO GO
Nodal crossing times
(1-3) GO/NO GO
Type of orbit
(1-1) GO/NO GO

(b) Describe the following satellite subsystem:
AVHRR
(2-1) GO/NO GO
Visual (Channel 1/2) range/resolution
(2-1 to 2-3) GO/NO GO
IR (Channel 3/4/5) range/resolution
(2-1 to 2-3) GO/NO GO

(c) Describe how TIROS data is acquired and distributed via:
APT
(4-1) GO/NO GO
WEFAX
(WEFAX Users Guide, pgs 10-11) GO/NO GO
SIDS
(local procedures) GO/NO GO
GOES TAP
(local procedures) GO/NO GO

(d) Describe the TIROS imagery available in the unit via:
APT
(7-1 to 7-13) GO/NO GO
WEFAX
(WEFAX Users Guide, pgs 10-11) GO/NO GO

SIDS Drop (local procedures)	GO/NO GO
GOES TAP (local procedures)	GO/NO GO
(e) Describe the IR enhancement curves to TIROS imagery (SIDS Drop) (local procedures/MIRF)	GO/NO GO
(f) Demonstrate ability to manually grid TIROS imagery. AWS-TR-74-250, DMSP Users Guide, pgs 6-3 to 6-8)	GO/NO GO

2. METSAT Imagery Analysis. This checklist is designed to ensure that forecasters are aware of current satellite imagery analysis techniques. Most of the items require the individual to demonstrate the ability to point out a specific feature or area on a satellite image. Some items, however, require a verbal response that indicate background knowledge. This background knowledge is felt to be essential for satellite interpretation. Except where indicated, these page numbers refer to "Weather Service Forecasting Handbook No. 6; Satellite Imagery Interpretation for Forecasters." This book is a compilation of many other works including "3WW/TN-81/001, Satellite Interpretation" and 'AWS/TR-79/003, Cloud Patterns and the Upper Air Wind Field." The only other reference is "1WW/TN-84/001, METSAT Imagery Interpretation Guide." AWSR 105-20 requires units to develop and use their own METSAT Imagery Reference File (MIRF). This provides excellent example imagery for training.

1.	On a cloud free, 1-2 km resolution visible satellite image, point out areas of forest, lakes, and mountains. (1-A-7, 1-A-10)	GO/NO GO
2.	Describe the difference between visible and infrared (IR) satellite imagery. (1-A-17)	GO/NO GO
3.	Explain the purpose of the MB enhancement curve. (1-A-27)	GO/NO GO
4.	Describe "foreshortening" and the affect it has on satellite interpretation. (1-E-3	GO/NO GO
5.	Explain "contamination." (1-E-4)	GO/NO GO
6.	Describe "attenuation" on a satellite image and the part of the image it affects most. (1-E-4)	GO/NO GO
7.	Explain "temperature averaging" on an IR satellite image. (1-E-4)	GO/NO GO
8.	Explain how "time response lag" affects the data on an IR satellite image. (1-E-4)	GO/NO GO
9.	Identify a "cloud band" on satellite imagery. (1-G-1)	GO/NO GO
10.	Identify a "cloud line" on satellite imagery. (1-G-1)	GO/NO GO
11.	Identify a "cloud street" on satellite imagery. (1-G-1)	GO/NO GO
12.	Identify stratocumulus on a satellite image. (1-G-2)	GO/NO GO
13.	Locate stratus and fog on a satellite image. (1-G-3)	GO/NO GO
14.	Describe "black fog" and "black stratus," and indicate where they form. (6-A-1, 6-A-7)	GO/NO GO
15.	Identify cumulus clouds on satellite imagery. (1-G-5)	GO/NO GO
16.	Identify "open cell" cumulus on satellite imagery. What does the presence of open cell cumulus tell about the environment? (1-G-10)	GO/NO GO
17.	Identify "closed cell" cumulus on a satellite image. What does the presence of closed cell cumulus tell you about the environment? (1-G-10)	GO/NO GO
18.	Locate altostratus and altocumulus on satellite imagery. (1-G-5)	GO/NO GO
19.	Locate cirrus on satellite imagery. (1-G-6)	GO/NO GO
20.	Identify cumulonimbus on satellite imagery. (1-G-7)	GO/NO GO

21.	Identify anvil cirrus on satellite imagery.(1-G-7)	GO/NO GO
22.	Locate snow on a satellite image. (1-G-7)	GO/NO GO
23.	Discuss some of the indications for snow cover versus cloud cover on satellite imagery. (1-A-15, 1-G-7)	GO/NO GO
24.	Give an estimate of surface wind direction based on satellite imagery. (1-G-10)	GO/NO GO
25.	Explain the difference between the "wind field" and the "relative motion field." Relate this to "deformation". (2-A-1 ... 5)	GO/NO GO
26.	Locate the upper level deformation associated with a comma cloud system. (2-A-16)	GO/NO GO
27.	Locate the lower level deformation associated with a comma cloud system. (2-A-17)	GO/NO GO
28.	Locate the cyclonic vorticity maximum within a comma cloud system. (2-A-13...15)	GO/NO GO
29.	Point out the areas of upward and downward vertical motion in and near a comma cloud system. (2-A-17)	GO/NO GO
30.	Identify a baroclinic leaf system on satellite imagery. (2-A-21)	GO/NO GO
31.	Indicate the location of the surface front with respect to a baroclinic leaf. (2-A-24)	GO/NO GO
32.	Indicate the location of a baroclinic leaf with respect to the upper level jet. (2-A-24)	GO/NO GO
33.	Locate the baroclinic zone cloud in a comma cloud system. (2-A-34)	GO/NO GO
34.	Locate the deformation zone in a comma cloud system. (2-A-34)	GO/NO GO
35.	Define vorticity lobe. (2-B-3)	GO/NO GO
36.	Define advection lobe. (2-B-3)	GO/NO GO
37.	Define shear lobe. (2-B-3)	GO/NO GO
38.	Give the four rules for locating jet streams from satellite imagery. (2-B-6...11)	GO/NO GO
39.	Locate the "warm conveyor belt" and "cold conveyor belt" within a mid-latitude wave cyclone. (2-C-10)	GO/NO GO
40.	Locate a "sharp ridge" in the upper level wind field on satellite imagery. (2-D-1)	GO/NO GO
41.	Locate a "medium ridge" in the upper level wind field on satellite imagery. (2-D-2)	GO/NO GO
42.	Locate a "broad ridge" in the upper level wind field on satellite imagery. (2-D-3)	GO/NO GO
43.	Discuss two rules for locating upper level troughs and apply them to satellite imagery. (2-D-3,4)	GO/NO GO
44.	Locate a "positive tilt" trough. (2-D-6)	GO/NO GO
45.	Give at least four characteristics of cloud patterns associated with cyclogenesis. (2-E-2,3; 2-H-6)	GO/NO GO
46.	Indicate the pattern on 6.7 micron moisture channel imagery that is associated with cyclogenesis. (2-E-21)	GO/NO GO
47.	Point out the difference between centers of cloud rotation and vorticity centers in a comma cloud system. (2-F-1...3)	GO/NO GO
48.	Identify arc clouds and gust fronts on satellite imagery. (4-A-1)	GO/NO GO
49.	Indicate areas where arc clouds will initiate new convection. (4-A-2...7)	GO/NO GO

50.	Under what conditions will a westward propagating gust front (backdoor) continue to thrive. (4-M-3)	GO/NO GO
51.	Given an area of cloud bands that formed after an outbreak of thunderstorms, specify areas where new thunderstorms are likely to develop. (4-C-1...4)	GO/NO GO
52.	Indicate areas where severe thunderstorms will develop with respect to the polar jet and subtropical jet. (4-D-1)	GO/NO GO
53.	Indicate areas where severe thunderstorms rarely form with respect to the subtropical jet. (4-D-1)	GO/NO GO
54.	Identify areas where thunderstorms will develop due to convective instability on 6.7 micron moisture channel imagery. (4-G-5,6)	GO/NO GO
55.	Identify the jet stream using 6.7 micron moisture channel imagery. (4-G-5)	GO/NO GO
56.	Identify a short wave using 6.7 micron moisture channel imagery. (4-G-5)	GO/NO GO
57.	Identify a trough using 6.7 micron moisture channel imagery. (4-G-5)	GO/NO GO
58.	Identify a deformation zone using 6.7 micron moisture channel imagery. (4-G-5)	GO/NO GO
59.	Identify an "enhanced-V" on IR satellite imagery. (4-I-2)	GO/NO GO
60.	Indicate when and where severe weather is likely to occur with respect to the "enhanced-V". (4-I-3)	GO/NO GO
61.	Identify a Mesoscale Convective Complex (MCC) on IR satellite imagery. (4-J-2)	GO/NO GO
62.	Indicate where the strongest winds and wind shear will occur with respect to arc clouds on satellite imagery. (4-L-4)	GO/NO GO
63.	Given a satellite image with anvil cirrus on it, indicate the direction of the vertical wind shear. (8-A-1,2)	GO/NO GO
64.	Identify mountain wave clouds on satellite imagery. (8-C-1...5)	GO/NO GO
65.	Identify areas and intensity of mountain wave turbulence on satellite imagery. (8-D-1,2)	GO/NO GO
66.	Identify "billow clouds" and locate the turbulence associated with them. (8-D-2)	GO/NO GO
67.	Locate transverse banding and associated turbulence on satellite imagery. (8-D-2)	GO/NO GO
68.	Specify where turbulence would be found with respect to a deformation zone on IR or moisture channel imagery. (8-B-6; 8-D-3)	GO/NO GO
69.	Indicate where turbulence would be found with respect to a frontal cloud band. (8-D-4)	GO/NO GO
70.	Locate areas of turbulence near a "dry slot" associated with a comma cloud system. (8-D-4)	GO/NO GO
71.	Identify regions where turbulence is likely to occur with respect to "dark bands" on moisture channel imagery. (8-D-5)	GO/NO GO
72.	Identify the eye, eye wall, rain bands, and central dense overcast (CDO) in a tropical cyclone. (1WW/TN-84/001)	GO/NO GO
73.	Identify curvature of the outflow in a tropical cyclone and explain its relationship to tropical cyclone development and intensity (1WW/TN-84/001)	GO/NO GO
74.	Identify the tropical upper tropospheric trough (TUTT) axis and cyclonic cells within the TUTT on satellite imagery.*	GO/NO GO
75.	Describe how the TUTT interacts with tropical cyclones.*	GO/NO GO

76. Estimate the wind speed at upper levels using satellite imagery.* GO/NO GO

77. Indicate the areas of strongest upward vertical motion, strongest upper and lower level wind flow, and identify anchoring monsoon depressions associated with a monsoon surge.* GO/NO GO

78. Diagram low level wind flow around a monsoon depression.* GO/NO GO

79. Identify the location of a land breeze and indicate its intensity vs that of the synoptic flow.* GO/NO GO

80. Describe the effects of terrain on land and sea breezes.* GO/NO GO

81. Locate a sea breeze and estimate its intensity on satellite imagery. (1WW/TN-84/001) GO/NO GO

82. Identify a volcanic eruption on satellite imagery. (1WW/TN-84/001) GO/NO GO

83. Locate dust and sand on satellite imagery. (1WW/TN-84/001) GO/NO GO

* These items have no specific reference. However, HQ AWS/DN will cover these topics in the next update of TR 240.

3. Equipment Operation:

a. Depending on the complexity and/or variety of features of unit operated METSAT Equipment (Alden 3000, Harris Laser Fax, Spembly, etc) the MSS may want to create an equipment training checklist similar to the preceding checklists. To write this checklist, follow the steps below):

(1) Review the available reference material (operators manuals, etc.). List the knowledge areas and tasks in which an operator must be proficient.

(2) From this list, build a GO/NO GO checklist. The checklist should be of sufficient detail to allow the trainer to thoroughly train and evaluate the student on at least the mechanics of equipment operation.

b. Following is an example training checklist for the Alden Radar/GOES Color Weather Display System Model C3000R/G. All references are to the Preliminary Operator's Manual.

1. Describe the basic components and functions of the C3000 R/G. (Pg ii-iii) GO/NO GO

2. Demonstrate powering up/powering down the system.(Pg 1-2) GO/NO GO

3. Perform the system start-up check. (Pg 2-5) GO/NO GO

4. Describe basic functions of the Function Keypad. Demonstrate use of zoom, roam, cursor, Z/R reset, image and directional arrow keys. (Pg 6-7) GO/NO GO

5. Interpret information provided in the System Header. (Pg 9-11) GO/NO GO

6. Briefly describe the functions of each operating mode on the main menu display. (Pg 12-13) GO/NO GO

7. Access and escape from any menu item. (Pg 12) GO/NO GO

8. Acquisition of Images Mode:

- Describe purpose of the CTRL C key. (Pg 14) GO/NO GO

- Define the following messages in the system header status line: (Pg 15) GO/NO GO

  - Standing by for satellite data.
  - Receiving satellite data
  - Reception is complete: End of picture
  - Reception is complete: Image full
  - Storing image on disk

- Demonstrate use of sub-menu 1 (Note: This sub-menu will probably not be used frequently) (Pg 15) GO/NO GO

- Demonstrate use of sub-menu 2 (Note: After writing a full image to disk, refer to "17,"Sector Creation, to learn/demonstrate using a full image in resolution A). (Pg 15) GO/NO GO

- Demonstrate use of sub-menu 3. Describe the difference between selecting "D" and "R." Which mode will you be using most often? (Pg 16-18) GO/NO GO

- Demonstrate use of sub-menu 4. (Pg 18-20) GO/NO GO

- Demonstrate use of sub-menu 5. (Pg 21-22) GO/NO GO

  – What does the sequence of disk addresses tell you?

  – What does the sequence of RAM addresses tell you?

- Demonstrate use of sub-menu 6. (Pg 23-24) GO/NO GO

  – Change the sequence of disk addresses. How many new addresses can you enter?

  – Change the sequence of RAM addresses.

- Demonstrate use of sub-menu 7. (Pg 24-25) GO/NO GO

9. Set-Up Mode:

   - Demonstrate use of sub-menu 1. (Pg 25-26) GO/NO GO

     – What sequence of pixels and lines are accepted under "A," 'B," and "C" resolutions?

   - Demonstrate use of sub-menus 2 and 3. (Note: Use of sub-menu 4 is usually preferable to sub-menus 2 and 3 when operating in resolutions "A" and "B." (Pg 25-26) GO/NO GO

   - Demonstrate use of sub-menu 4. What percentage of the total image is acquired under A and B resolutions? Once you have acquired an image in A resolution, can you later recapture more of the image in B or C resolution? (Pg 27) GO/NO GO

10. Clock Operations Mode—Demonstrate setting a new time and date into system. (Pg 28-30) GO/NO GO

11. Disk Operations Mode. GO/NO/ GO

    - Demonstrate use of sub-menu 1. (Pg 32) GO/NO GO

      – Describe the information contained in the disk files directory.

    - Demonstrate use of sub-menu 2. Recall 6 files from disk (both in sequence and out of sequence) to RAM. (Pg 32-33) GO/NO GO

    - Demonstrate use of sub-menu 3. (Pg 33) GO/NO GO

12. Enhancement of Images Mode.

    - Demonstrate use of sub-menu 1 on an un-enhanced IR image (linear gray shades). (Pg 36) GO/NO GO

      – False color enhance cold cloud tops.
      – False color enhance warmer lower level clouds.
      – Use the "flash to red" feature to identify a particular "gray shade" range on the image.

    - Demonstrate use of sub-menu 2. (Pg 36-37) GO/NO GO

      – Change the false color enhancement above back to a linear gray scale. (Note: Use the B/W reset button on the function keypad to reset image).

    - Demonstrate use of sub-menu 3. (Pg 37) GO/NO GO

      – Create a false color enhancement and store it on disk.

    - Demonstrate use of sub-menu 4. (Pg 37) GO/NO GO

      – Recall a false color enhancement from disk.

- Demonstrate use of sub-menu 5. GO/NO GO

- Demonstrate use of sub-menu 6. (Pg 38) GO/NO GO

  – Change number from 16 to another appropriate number and back to 16.

13. Annotation of Images.

- Select different sizes and colors of character strings and display them on the soft copy image. (Pg 39-41) GO/NO GO

- Demonstrate use of graphics tablet. (C3000G Supplement) GO/NO GO

  – Describe the graphic tablet components.

  – Demonstrate enabling the tablet (sub-menu 7).

  – Demonstrate creating text in different colors on the soft copy.

  – Demonstrate drawing lines in different colors on the soft copy.

  – Demonstrate contouring in different colors on the soft copy.

14. Diagnostics Mode—understand this mode should not be operated unless at the direction of maintenance personnel. (Pg 42)

15. Looping of Images Mode.

- Demonstrate use of sub-menu 1. (Pg 43) GO/NO GO

- Demonstrate use of sub-menu 2. (Pg 44) GO/NO GO

  – Change the sequence of RAM looping.

- Demonstrate use of sub-menu 3. (Pg 44-45) GO/NO GO

- Demonstrate use of sub-menu 4. (Pg 45-46) GO/NO GO

  – Change the sequence of disk looping.

- Demonstrate use of sub-menu 5. (Pg 46) GO/NO GO

- Demonstrate use of sub-menu 6. (Pg 46) GO/NO GO

- Demonstrate use of sub-menu 7. (Pg 46-47) GO/NO GO

  – Change the rate of RAM looping.

  – Create a delay in the loop start time.

  – Create a delay at the end of loop stop time.

  – Go from continuous looping to a set number of loop repeats.

- Demonstrate use of sub-menu 8. (Pg 47) GO/NO GO

  – Understand that the operator must employ this sub-menu when looping images stored in disk on RAM.

- In conjunction with what you learned under false color enhancement, create a false color enhancement, and loop a series of images with the enhancement applied. GO/NO GO

16. Manipulation of Images Mode.

- Demonstrate use of sub-menu 1. (Pg 48) GO/NO GO

- Demonstrate use of sub-menu 2. (Pg 49) GO/NO GO
- Demonstrate use of sub-menu 3. (Pg 49) GO/NO GO
- Demonstrate use of sub-menu 4. (Pg 49) GO/NO GO
- Demonstrate use of sub-menu 5. (Pg 49) GO/NO GO
- Demonstrate use of sub-menu 6. (Pg 50) GO/NO GO
  - What will happen to the image if a value of 255 or greater is set in?
  - What will happen to the image if a value of 0 is set in?
- Demonstrate use of sub-menu 7. (Pg 50) GO/NO GO
  -What will happen to the image if a value of 255 is set in?
  - What will happen to the image if a value of 0 is set in?

17. Peripherals Mode (may be N/A to most units).
    - Demonstrate use of sub-menu 1. GO/NO GO
    - Demonstrate use of sub-menu 2. GO/NO GO
18. Sector Creation Mode.
    - Understand the primary need to use this mode is for those occasions when the entire picture is needed in resolution A. GO/NO GO
    - Demonstrate use of sub-menu 1. (Pg 53) GO/NO GO
      - Recall one of the nine available sectors.
    - Demonstrate use of sub-menu 6. (Pg 54) GO/NO GO
    - Demonstrate use of sub-menu 7. (Pg 54-55) GO/NO GO
    - Demonstrate use of sub-menus 2, 3, and 4. (Pg 53-54) GO/NO GO
19. System Shutdown Mode→understand that this mode should be initiated if an interruption of power is anticipated. GO/NO GO

METSAT DIRECTIVES

1. The DMSP Security Classification Guide establishes the basis for determining the proper classification for imagery and information associated with DMSP.

2. AFR 50-5, Formal Schools, provides procedures for requesting training and brief descriptions of courses conducted by Air Force commands, DOD, AFIT, and other government agencies.

3. AFR 50-9, Special Training, provides procedures for requesting non-routine (or one-time only) training.

4. AFR 50-23, On-The-Job Training, describes Air Force on-the-job and upgrade training (OJT/UGT) procedures and provides guidance on documentation. Includes examples of forms used for OJT/UGT.

5. AWSR 50-5, Follow-On Training Module Program, describes how units request and use follow-on training (FOT) materials.

6. AWSR 52-3, Certification of Weather Personnel, details forecaster and observer certification procedures.

7. AWSR 52-6, Requirements for Technical Training and Application and Selection Procedures details how units request training.

8. AWSR 105-20, Meteorological Satellite Data:
   a. Establishes AWS METSAT policy.
   b. Defines procedures HQ AWS, wings/ squadrons, and Dets/OLs/WSUs use to acquire and apply METSAT data.
      (1) Defines procedures units use to identify METSAT requirements, which can't be met locally, to higher headquarters.
      (2) Defines the duties and responsibilities of MSCs/MSSs.
   c. Describes the tasking procedures for DMSP tactical terminal deployment and relocations.
   d. Describes archival/disposition procedures for METSAT imagery.
   e. Provides a guide for processing requests for release of DMSP imagery.

SAMPLE

DEPARTMENT OF THE AIR FORCE
Det x, xxWS
Blank AFB

Detachment Operating Instruction 105-XX

Weather

UNIT METSAT PROGRAM

This instruction prescribes the unit meteorological satellite (METSAT) program and applies to all forecasters and observers. It implements AWSR 105-20.

1. Responsibilities:

a. The commander is responsible for the METSAT training program and will appoint a METSAT coordinator (MSC) and/or METSAT specialist (MSS) as appropriate.

b. The MSC (or MSS as appropriate) will establish and manage the program. (Note: An MSC is appointed for units which have METSAT direct readout capability; DMSP sites. Commanders have the option of appointing an additional duty MSS in addition to the MSC if they wish. Otherwise, an MSS is appointed for units which receive METSAT data by other than direct readout; GOES Drop etc).

c. The Station Chief will help the MSC or MSS incorporate METSAT imagery and forecasting techniques into the LAFP.

d. All personnel will participate in the METSAT training program. Forecasters will use METSAT data as a forecasting tool.

2. Procedures:

a. The MSC will: (this subparagraph would apply to direct readout (DRO) sites where the commander doesn't appoint an additional duty MSS).

(1) Conduct and document initial METSAT task certification training for all forecasters and observers.

NOTE: The unit commander, station chief, and other assigned weather officers will complete this training.

(2) Conduct METSAT recurring training:

(a) Schedule and track recurring training on an AF Form 1320 or suitable substitute.

(b) Tailor recurring training sessions to local conditions/ climatology. See SOP X, Recurring METSAT Training Topics/Schedule.

(c) Vary the composition of the training sessions by using combinations of seminars, slide-tape programs, and reviews of reference and initial training materials. Each session will include a review of all unit METSAT OIs/SOPs and any new/different techniques developed by higher headquarters.

(d) All forecasters may be assigned to prepare/present seminars as part of these sessions. Provide technical assistance/guidance as needed to those who are tasked to conduct such seminars.

(3) Work with the Station Chief to incorporate METSAT into the LAFP. Develop and/or implement imagery enhancements, expansions, etc to support the LAFP and other METSAT users. See SOP Y, Use of METSAT Data in the LAFP.

(4) Develop procedures to support special requirements:

(a) Severe Weather Requirements. Example: A procedure to recall the Mark IV MSC, or a designated properly trained forecaster to use the Mark IV capabilities to help forecast severe weather situations.

(b) Aircraft deployment, employment and/or support to special customers.

(5) Establish and maintain a METSAT Imagery, Reference File (MIRF) IAW AWSR 105-20.

(a) Example imagery requirements (These examples should also be provided to units on the Satellite Imagery Dissemination System (SIDS)).

1. Clear sky day/night visual/IR composite imagery for each season.

2. Typical enhanced IR pictures, including enhancement curves depicting the breakpoints for each enhancement.

3. Typical pictures of meteorological elements as applicable (e.g. thunderstorms, jet streams, fronts, snow cover, tropical cyclone development, monsoon surges, etc)

4. Examples of typical polar orbiter expansions and/or geostationary sectors used in the unit.

(b) Also maintain METSAT related forecast techniques and rules of thumb, unless they are contained in the TFRN.

(6) Develop procedures to schedule satellite passes with AFCC site personnel to satisfy:

(a) Routine requirements.

(b) Short-notice and special requirements.

(NOTE: Requirements for playbacks for application of thresholding, enhancements etc, should also be scheduled. Scheduling requirements with AFCC personnel is a two way street. They also have requirements for PMI and training. Close coordination is required to ensure everybody's requirements are met.)

(7) Develop procedures to coordinate METSAT requirements with Tactical Imagery Dissemination System (TIDS)/SIDS users. Maintain a list of requirements and update it when required.

(8) Quality control METSAT Imagery IAW AWSR 105-20.

(a) Do data quality and enhancements meet customer's requirements (both at the forecast agency collocated with the site and SIDS/TIDS drop)?

(b) Are the Institute of Electrical and Electronic Engineered (IEEE) test charts transmitted over SIDS/TIDS circuits biweekly? Is appropriate action taken when image quality is not acceptable?

(c) Are weekly checks on DMSP data location accuracy performed IAW Block V operating procedures?

(d) Do AFCC personnel check the hard-copy device once/month to check for the proper number of gray shades?

(NOTE: Suggest establishing a suspense list and maintaining a log book to ensure these actions are done in a timely manner and the results are documented.)

(8) Submit Site Data Application Reports (SDAR) IAW AWSR 105-20.

(9) Submit Primary Data Anomaly (PRIDAN) and/or METSAT Data Anomaly reports when required IAW AWSR 105-20.

(10) Archive/Dispose of METSAT data received at the DMSP site IAW AWSR 105-20, Atch 3.

b. The MSS will: (This subparagraph would apply to non-DRO sites where an MSS is appointed).

(1) Same as para 3a(1) above.

(2) Work with the station chief to incorporate METSAT into the LAFP. See SOP Y, Use of METSAT Data in the LAFP.

(a) At locations supported by a SIDS/TIDS drop from a DMSP terminal establish procedures to coordinate imagery requirements (enhancements, expansions, etc) to support the LAFP with the site MSC.

(b) At locations supported by a GOES Tap, select appropriate enhancements, expansions, etc, using the capability of the GOES Tap to support the LAFP and other METSAT users.

(c) At locations supported by a GOES Drop, WSFO Drop or similar system, establish procedures to coordinate data requirements with the servicing agency.

(d) At locations supported by DFS, establish procedures to coordinate data requirements with AFGWC/CMV.

(3) METSAT Imagery File (same as para 2a(5) above).

(4) Quality Control METSAT Imagery IAW AWSR 105-20.

(a) At SIDS locations:

1. Establish procedures for weekly checks to ensure imagery quality, imagery enhancements and gridding are suitable for analysis and briefing purposes, and to notify the site MSC of any problems.

2. Establish procedures to evaluate the quality of the IEEE test chart reception and report problems to the MSC.

(b) At GOES Tap, GOES Drop, WSFO Drop and DFS sites, establish procedures to evaluate imagery quality and take appropriate action when problems are encountered.

(NOTE: Again, suggest establishing a suspense system and maintaining a log book to ensure these actions are done, and the results documented).

c. All personnel:

(1) Complete initial METSAT training as required and participate in recurring METSAT training.

(2) Follow procedures established in the LAFP for use of METSAT data.

(3) Follow procedures established for equipment operation (as appropriate).

SAMPLE

SOP X, RECURRING METSAT TRAINING TOPICS/SCHEDULE

SAMPLE METSAT Application Topics. For this sample all references were taken from Weather Service Forecasting Handbook No. 6, Satellite Interpretation for Forecasters. However, AWS/TC-87/001 contains other source materials for these topics, including the follow on training modules.

1. Surface Cyclogensis—Reference: WSFH #6, Ch 2, Jan seminar.

2. Precipitation Forecasting—Reference: WSFA #6, Ch 3, Mar seminar.

3. Convective Activity—Reference: WSFH #6, Ch4, May seminar.

4. Clear Air Turbulence—Reference: WSFH #6, Ch 8, Jul seminar.

5. Synoptic Scale Interpretation/Analysis—Reference: WSFH #6, Ch 6, Sep seminar.

6. Fog and Stratus Forecasting—Reference: WSFH #6, Ch 6, Nov seminar.

SAMPLE

SOP Y, USE OF METSAT DATA IN THE LAFP

1. Analyze Satellite pictures at least once every three hours (where available) for:
   a. Jet Stream location
   b. Frontal system location (for the location of the surface front)
   c. Tropical features (monsoon surges, shear lines, waves, etc)
   d. Convective areas (development, movement and severity)
   e. Moisture advection
   f. Areas of turbulence
   g. Stable and unstable cloud types
   h. Significant areas of convergence and divergence
   i. Vorticity centers and lobe axes (in conjunction with satellite interpretation messages (SIM), when available)

NOTE: Suggest doing the analysis directly onto the satellite picture, or an acetate overlay of the picture.

2. Initialization and cross-checking of vorticity analysis forecast products when available (NOTE: This example deals with the Nested Grid Model (NGM)).
   a. Compare the appropriate SIM (TBXX6, etc) with the same time satellite picture. Use the TBXX6 to help identify features on the picture.
   b. Use the 00Z and 12Z satellite pictures to initialize the NGM series. Ensure the NGM has correctly located vorticity maxima and lobes. If necessary, adjust the positions of these features on the NGM.
   c. Using the twelve-hour forecast, interpolate locations of vorticity maximas and lobes for 06Z and 18Z. Compare these positions with the 06Z or 18Z satellite pictures to determine if the NGM is handling these features properly.
   d. Compare the twelve-hour, forecast vorticity maxima and lobe positions on the NGM with the 00Z or 12 SIM and the 00Z or 12Z satellite pictures to determine if the NGM is handling these features properly. If necessary, this process may be repeated for the 24-, 36-, and 48- hour forecasts.

3. Cross-checking other centralized products. Compare your satellite analyses with surface charts and severe weather progs received from centralized forecast facilities. This will allow you to fine-tune these products for your area of responsibility.

4. METSAT imagery should be integrated into shift-change briefings and forecasting discussions, by highlighting the analyses from paragraph 1 and discussing the results of the initialization and cross-checking process described in paragraphs 2 and 3.

COURSE CHART C30ZR2524 009—WEATHER SATELLITE SYSTEMS AND PHOTO INTERPRETATION—TRAINING CONTENT

Orientation (1.5 hrs)

Principles and Systems (12 hrs)

Basic Principles of Cloud Photo Interpretation (8 hrs)

Cloud System Identification (15 hrs)

Practical Applications (18 hrs)

METSAT Program Management (4 hrs)

USAF Graduate Evaluation Program (.5 hr)

Measurement and Critique (2 hrs)

Course Critique and Graduation (1 hr)

MT: Commander's Call (1 hr)

End-of-Course Appointments and Predeparture Safety Briefing (1 hr)

(Equipment Hazards and Personnel Safety Integrated with above subjects) 64 Hours Total

COURSE CHART C40ST2524 006 -WEATHER SATELLITE SYSTEMS AND PHOTO INTERPRETATION (MOBILE TEAM)—TRAINING CONTENT

Orientation (.5 hr)

Basic Principles of Cloud Photo Interpretation (12 hrs)

Cloud System Identification (15 hrs)

Practical Applications (11.5 hrs)

USAF Graduate Evaluation Program (.5 hr)

Critique and Graduation (.5 hr)

(Equipment Hazards and Personnel Safety Integrated with above Subjects) 40 Hours Total

COURSE OUTLINE, C40ST2524-007, MARK IV SATELLITE RECEIVER OPERATION

Instructional Guidance: Part I This course is designed to show students how to use the Mark IV satellite van to receive, process, and enhance satellite imagery, but certain information must be discussed before using the van. The instructor will discuss the objective in the classroom, then demonstrate each step in the van and have the students practice each step in the van. Emphasize safety throughout the course.

Student Instructional Materials
Mark IV User's Guide
GOES User's Guide

Training Equipment
Mark IV Van (3 hrs)

Training Methods
Lecture/Discussion (1 hr)
Demonstration (1 hr)
Performance (2 hrs)

Instructional Guidance: Part II The instructor will discuss the receiving of a satellite pass in the classroom, then demonstrate each step in the van and have the students practice each step in the van. Emphasize safety throughout the course.

Student Instructional Materials
Mark IV User's Guide
GOES User's Guide

Training Equipment
Mark IV Van (3 hrs)

Training Methods
Lecture/Discussion (1 hr)
Demonstration (1 hr)
Performance (2 hrs)

Instructional Guidance: Part III The instructor will discuss processing of satellite data in the classroom, then demonstrate each step in the van and have the students practice each step in the van. Emphasize safety throughout the course.

Student Instructional Materials
Mark IV User's Guide
GOES User's Guide

Training Equipment
Mark IV Van (3 hrs)

Training Methods
Lecture/Discussion (2 hrs)
Demonstration (2 hrs)
Performance (4 hrs)

Instructional Guidance: Part IV The instructor will discuss the built-in Mark IV enhancements and how to adapt enhancement curves from the GOES User's Guide. The instructor will then demonstrate how to use the built-in Mark IV enhancements and show how GOES curves can be adapted for use in the Mark IV. The students will practice performing each task. Emphasize safety throughout the course.

Student Instructional Materials
Mark IV User's Guide
GOES User's Guide

Training Equipment
Mark IV Van (3 hrs)

Training Methods
Lecture/Discussion (3 hrs)
Demonstration (3 hrs)
Performance (13.5 hrs)

ADDITIONAL TRAINING MATERIALS

Following is a list of current reference material for technical training of satellite interpretation. This list is applicable to initial training as well as recurring training.

1. The GOES User's Guide. 1983 edition by USDC, NOAA-NESDIS.

ABSTRACT: Provides current and potential data users with background information on the Geostationary Operational Environmental Satellite (GOES) System. General details of the spacecraft and instrumentation carried on board are given. Types of images and data available are presented. Primary source for obtaining IR enhancement curve and gray scale value information.

2. 1WW/TN-83/001, entitled "METSAT USER's GUIDE." 1983 edition by 1st Weather Wing, Air Weather Service, USAF.

ABSTRACT: Provides basic information on the geosynchronous meteorological and polar orbiting satellite systems. Discusses general details of the spacecraft and instrumentation. Includes a glossary of terms.

3. 3WW/TN-81/001, entitled, "Satellite Interpretation." 1981 edition by 3d Weather Wing, Air Weather Service, USAF.

ABSTRACT: Describes cloud formations as seen on enhanced infrared and visible GOES satellite photographs and attempts to relate the meteorological causes for these formations. Uses normal synoptic data to reinforce interpretation of satellite imagery. Examples are primarily over CONUS.

4. 1WW/TN-84/001, entitled "METSAT Imagery Interpretation Guide" by 1st Weather Wing, Air Weather Service, USAF.

ABSTRACT: Provides descriptions and photographic examples of cloud and earth phenomena as seen from polar-orbiting and geostationary meteorological satellites. Describes basic cloud types including comma cloud systems, low- and high-level wind flow cloud patterns, and miscellaneous cloud and earth features. Examples are primarily from the Pacific Ocean theatre of operations.

5. Weather Service Forecasting Handbook No. 6, entitled "Satellite Imagery Interpretaion for Forecasters." 1986 edition compiled by USDC, NOAA/NESDIS.

ABSTRACT: Designed as a satellite applications guide. Organized by meteorological phenomenon and carefully constructed to reflect the current state of the science of imagery interpretation. This handbook will become the primary source for all government agency satellite imagery interpretation training. It contains a glossary and is in loose-leaf form for annual updating.

6. "Using Satellite Imagery to Detect and Track Comma Clouds and The Application of the Zone Technique in Forecasting Severe Storms." 1977 edition by Miller and McGinley. Management and Technical Services Company of General Electric Corporation.

ABSTRACT: Describes and demonstrates how satellite imagery can be used by operational forecasters in the prognosis of severe local convective storms. Primary emphasis is placed on recognition of favorable severe weather zones associated with various synoptic patterns and the dynamic role of the comma cloud in initiating significant severe convective activity.

7. AWS/TR-212, entitled "Application of Meteorological Satellite Data in Analysis and Forecasting." 1969 edition by AWS, USAF.

ABSTRACT: Provides guidance in the interpretation of polar orbiting satellite cloud photographs and presents techniques for meteorological analysis and forecasting. Contains a satellite cloud atlas and glossary.

8. Mark IV Users Guide

ABSTRACT: Provides guidance on how to exploit the DMSP Mark IV TACTERM Generation Subsystem.

9. AWS-TR74-250, DMSP Users Guide

ABSTRACT: Describes the capabilities of the spacecraft, sensors, and data display segments of the Mark IIA/III TACTERMs. Many meteorological and geophysical uses of these data are examined as well as examples to illustrate the capabilities of the system to tailor the imagery for a large variety of present and future users.

10. WEFAX Users Guide

ABSTRACT: Provides general information about the GOES satellite, the WEFAX ground system and services available. Details on the real-time data links are included for those planning to install ground stations to receive WEFAX broadcasts.

11. TIROS-N Direct Readout Services Users Guide

ABSTRACT: Provides a description of the TIROS program, satellite and supporting systems, including description and use of the TBUS bulletin.

12. ESA SP-1041, entitled "Introduction to the METEOSAT System"

ABSTRACT: Provides a description of the METEOSAT system, satellite and supporting ground systems, including a discussion of WEFAX and High Resolution sectors.

13. Block 5D, Operating Procedures for Tactical Sites

ABSTRACT: Outlines Block 5D tactical site tracking and data location procedures. It also defines standard nomenclature and conventions to be used in Block 5D operations.

14. Operators Manual, Alden GOES Color Weather Display System, Model C3000R/G

ABSTRACT: Provides a detailed description of how to use the Alden C3000R/G

Following is a list of future training references planned or being worked.

1. AWS forecaster memo or technical note specifically dealing with satellite interpretation in the tropics. (Planned for late 1987 release.)

2. A series of six follow-on-training modules jointly produced by AWS, NWS, NOC, and NESDIS. Modules will provide training in basic to advanced satellite interpretation techniques using geostationary satellites. (Planned for release 1987 through 1988.)